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10/767,798	01/29/2004	Neil G. Murray JR.	TRW(TE)6888	7228

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EXAMINER	
VERBITSKY, GAIL KAPLAN	

ART UNIT	PAPER NUMBER
2855	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/767,798	MURRAY ET AL.	
	Examiner	Art Unit	
	Gail Verbitsky	2855	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 February 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8,12-21 and 24-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,12-21 and 24-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-4, 13-15, 20-21, 25-26, 29-30 are finally rejected under 35 U.S.C. 103(a) as being unpatentable over Messler (U.S. 20040114662/ 7268866) in view of Jaret et al. (U.S. 6177649) [hereinafter Jaret].

Messler discloses in Figs. 1, 4 a device/ method in the field of applicant's endeavor of positioning two plastic pieces 11 and 12 to abut each other in a weld and applying a laser beam 20 continuously (plurality of times) directed onto the pieces, the plastic piece 12 is absorbent to the laser radiation (therefore, can heat the weld). An inspection radiation device 30, 31, a camera 39 and a pyrometer 58 are used during welding (7268866, as the weld being formed, col. 2, line 67, col. 3, lines 1-2) for testing of the welding process (para [0011]). The piece (second) 11 is transparent to the laser beam; therefore, the location of the abutment of two pieces is being heated by the laser beam 20. Messler also teaching to have a feedback to a welding apparatus (weld controller) in order to regulate the laser beam intensity/ modifying the heating if a signal (parameter/ temperature) is too high (outside desired or upper threshold or lower threshold). The device is used for obtaining a thermal data (predetermined wavelength corresponding to the IR) based on the thermal radiation 33 emanating from the weld

and detected by the CCD 39 (and the pyrometer 58) of the entire weld in order to determine (parameter/ quality, col. 6, line 6) the integrity/ quality of the weld (col. 5, lines 47-67, col. 6, lines 1-8). It is inherent, that having said image of the entire weld would ensure obtaining temperature at different points of the entire weld. The image(s) is analyzed in the evaluation unit. The pyrometer 58 is used to analyze the thermal radiation emitted by the weld, comparison with a reference, if the deviations are determined; the intensity (heat) of the laser is modified. Mirrors 23, 24 are moved to direct the laser onto the weld.

For claim 13: It is inherent, that the weld should be heated by the laser beam a plurality of time at a plurality of points in order to create a weld having a desired length.

For claim 15: It is inherent that the controller would compare the measured radiation with a threshold or desired radiation in order to determine if there is lack of quality (fails to meet the requirements), as very well known in the art.

For claim 29: the laser beam is reflected by a reflective device (mirrors).

Please note, since the weld is in between the layers, then, according to Fig. 5, the emanating radiating passing through the second layer 11 toward the CCD 39.

For claim 25: Please note, that the laser is constantly directed (plurality of times) onto the weld, and that the modifying of the heating by laser would also take place during that directing.

The method step will be met during the normal operation of the device stated above.

Although the CCD camera receives thermal radiation from the weld, Messler is not clear if the CCD is acting as a thermal camera providing a thermal image. Messler

does not explicitly teach that the thermal data provided by the pyrometer is in the form of thermal images.

Jaret discloses a device in the field of applicant's endeavor comprising a camera producing thermal images of the weld during welding.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device disclosed by Messler, so as to have a thermal camera (or replace the pyrometer with the thermal camera, or modify the CCD to enable it to produce thermal images), as taught by Jaret, in order to provide the operator not only with the visual data of the weld, but also with the image of thermal data of the weld, in order to allow the operator to take necessary actions, if one area is heated less than another.

3. Claim 12 is finally rejected under 35 U.S.C. 103(a) as being unpatentable over Messler and Jaret, as applied to claims 1-4, 13-15, 20-21, 25-26, 29-30 above, and further in view of Hashimoto.

Messler and Jaret disclose the device/ method as stated above.

They do not explicitly teach an alarm.

Hashimoto discloses in Fig. 1 a method/ device for monitoring quality of a weld comprising heating the weld and immediately (substantially simultaneously) acquiring a thermal distribution signal on another side of a second piece (col. 2, lines 25-33). The device also has a feedback control for analyzing the data and determining if the data meets an associated criterion and modifying the heating/ cooling and providing a warning signal/ alarm.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add an alarm, disclosed by Messler and Jaret, so as to notify the operator about failure and to allow the operator to control defects, lack of integrity of the weld caused by improper welding process/ improper heating by controlling the weld temperature within predetermined (desired/ standard) limits.
The method step will be met during the normal operation of the device stated above.

4. Claims 7, 18 are finally rejected under 35 U.S.C. 103(a) as being unpatentable over Messler and Jaret, as applied to claims 1-4, 13-15, 20-21, 25-26, 29-30 above, and further in view of Schepard(U.S. 200201724410).

Messler and Jaret disclose the device/ method as stated above.

They do not explicitly teach the limitations (determining width) of claims 7 and 18.

Schepard discloses a device in the field of applicant's endeavor, the device can be used to determine the size (thus, inherently, width) of the weld and the quality (presence of cracks, voids, defects, discontinuities) of the bond (col. 7, lines 1-2) and, inherently, compare them to the threshold (standard) by means of the histogram.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add a feature capable of determining the size of the weld, as taught by Schepard, so as to control the size of the weld, and thus the quality of the weld, because the proper weld size is very important in some miniature applications.
The method step will be met during the normal operation of the device stated above.

4. Claims 8, 19 are finally rejected under 35 U.S.C. 103(a) as being unpatentable over Messler, Jaret and Schepard, as applied to claims 7, 18 above, and further in view of Traub.

Messler, Jaret and Schepard disclose the device/ method as stated above.

They do not explicitly the limitations of claims 8 and 19, i.e., determining that a parameter (width) is outside of the threshold.

Traub teaches a device / method in the field of applicant's endeavor wherein, in an automatic mode, a thermal signal (parameter) from a weld is compared to a signal recorded in memory (reference/ threshold), if the signal is higher or lower than the reference (does not meet an associated criterion), welding parameters are being adjusted by a (feedback) control circuitry (weld controller).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the controller of the device, disclosed by Messler, Jaret and Schepard, so as to have a feedback weld controller, as taught by Traub, in order to enable the device not only to detect failure but also to implement corrective functions.

The method step will be met during the normal operation of the device stated above.

6. Claims 24 and 28 are finally rejected under 35 U.S.C. 103(a) as being unpatentable over Messler and Jaret, as applied to claims 1-4, 13-15, 20-21, 25-26, 29-30 above, and further in view of Ish-Shalom et al. (U.S. 6299346) [Ish-Shalom].

Messler and Jaret disclose the device and method as stated above.

They do not teach the limitations of claims 24 and 28.

Ish-Shalom discloses a device wherein in order to obtaining a correct temperature (thermal data) of a test sample (wafer), IR wavelengths from the heating lamps cut off (filtered).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device, disclosed by Messler and Jaret, so as to cut off the heating radiation from the final thermal data results, as taught by Ish-Shalom, in order to preserve the accuracy of the thermal data, as already suggested by Ish-Shalom.

The method steps will be met during the normal operation of the device stated above.

7. Claims 5-6, 16-17, 31-34 are finally rejected under 35 U.S.C. 103(a) as being unpatentable over Messler and Jaret, as applied to claims 1-4, 13-15, 20-21, 25-26, 29-30 above, and further in view of Shepard (U.S. 200201724410).

Messler and Jaret disclose the device and method as stated above.

They do not explicitly teach a plurality of images and determining time of taking an image.

Shepard teaches to obtain (plurality) thermal images over time and sample them over time in order to reconstruct the entire image. This would suggest that Schepard determines the time of taking the particular image. It is inherent, that Shepard would not take any images after the full image reconstructed, and there is no need to take more images.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device/ method disclosed by Messler and Jaret,

so as to take an image at a time, as taught by Schepard, in order to obtain a time temperature function which would allow the operator to determine heat conductivity/ diffusion of the weld and thus, it's quality, as very well known in the art.
The method step will be met during the normal operation of the device stated above.

8. Claim 27 is finally rejected under 35 U.S.C. 103(a) as being unpatentable over Messler and Jaret, as applied to claims 1-4, 13-15, 20-21, 25-26, 29-30 above, and further in view of Sandvoss.

Messler and Jaret disclose the device and method as stated above.

They do not explicitly teach the limitations of claim 27.

Sandvoss discloses a device/ method in the field of applicant's endeavor comprising heating a weld with a laser beam. The laser heat can be regulated by intensity, duration or speed of the moving laser beam (col. 3, lines 4-7).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the IR thermal data means, disclosed by Messler and Jaret, so as to regulate heating by varying duration, intensity or the speed of the laser beam, as taught by Sandvoss, so as to provide the operator with an appropriate method of regulating of the heat, as very well known in the art.
The method step will be met during the normal operation of the device stated above.

Response to Arguments

9. Applicant's arguments with respect to claims 1-8, 12-21 and 24-36 have been considered but are not persuasive.

Applicant states that the pyrometer of Messler does not collect IR from the weld 15 and pool material 47. Messler states that the pyrometer 58 detects the thermal radiation 60 emitted by the weld. This is used to regulate the melt temperature (col. 6, lines 65-68) since the pyrometer is integrated with a feed back control (col. 7, lines 8-13). Applicant refers to claim 1 of Messler to prove that none of the measured reflected radiation is used to form a thermal image during weld. This argument is not persuasive because, as said above in the disclosure Messler considers the use of the pyrometer during forming the weld to regulate temperature of the melt. We do not know if the image on the screen is a thermal image because Messler does not explicitly teach forming a thermal image. We do not know if the image on the screen is a thermal image. However, Jaret, who teaches that the IR camera could be used to obtain a thermal image of a weld, cures this deficiency.

Applicant states that Jaret does not observe thermal image from the pool and weld. This argument is not persuasive because Jaret teaches that it is very well known in the art to use an IR camera which indicates a thermal profile of the weld prior, during and after fusion/ welding (col. 1, lines 24-31).

Applicant states that the combination of references does not teach to inspect the welt in its entirety, as stated in claim 2. This argument is not persuasive; because it is considered that it is a choice of the operator to obtain the image of the surface of interest in its entirety.

Applicant states that the references do not suggest directing a laser beam over the path of the weld pool multiple times, as stated in claim 25 of the instant invention. This

argument is not persuasive because in Messler, the laser is constantly (plurality of times) directed onto the weld.

Applicant states that the references do not teach to stop obtaining images when the weld is formed, as stated in claim 33. This argument is not persuasive because Sheppard teaches to analyze the image and to stop taking images if the analyzed image is acceptable. also, it would be inherent, that nothing in Messler or Jaret could prevent them from stopping taking thermal radiation/ thermal images any time.

In addition, please note, it appears that this particular limitation has not been clearly described nor in the disclosure or in the originally filed claims.

Applicant states that the references do not teach the limitations of claims 13 and 24 in that the references do not teach collecting radiation passing through the second piece of material from the weld. This argument is not persuasive because Applicant does not explicitly teach to collect radiation passing through the second piece. Applicant claims "determining range of wavelengths of IR that will pass through the second piece", see claim 13. It is the claims that define the claimed invention, and it is claims, not specification that are anticipated or unpatentable. Constant v. Advanced Micro-Devices, Inc., 7 USPQ2d 1064. In addition, to satisfy the claimed limitation, Messler teaches that the piece 18 is transparent to the laser radiation; this would suggest that the wavelengths of the passing radiation are known.

Applicant states that in Messler, the laser beam is directed over the path where the seam is formed only once and not multiple times. This argument is not persuasive

because, in the broadest reasonable interpretation, the Examiner considers a prolonged period of time being a multiple times.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art cited in the PTO-892 and not mentioned above disclose related devices and methods.

Takeda et al. (U.S. 6462299) discloses the device and method in the field of applicant's endeavor comprising pieces 1a and 1b abutting each other for forming a weld (pool) and heating them with an induction heating apparatus 9 while the temperature is raised to a predetermined (annealing) temperature. This would imply, that the heating and temperature measurements (thermal image) are done simultaneously.

Geler et al. (U.S. 5474225) discloses the device and method in the field of applicant's endeavor. Geler monitors a just completed weld.

Jones (U.S. 4224499) discloses the device and method in the field of applicant's endeavor comprising a copper and an aluminum pieces butt-welded. The process involving heating and melting (pool formation) their interface. Jones does not teach to take IR images simultaneously with heating.

Juret et al. (U.S. 6177649) teaches to monitor a welding process by obtaining thermal images by using an IR camera in real time (simultaneously). Juret teaches to monitor the quality of weld and control the welding process. If a defect of the weld is noted (weld does not meet a required criteria), the weld head should be repaired (changing variables).
Shepard (U.S. 6585146) discloses in Fig. 1 a device/ method for monitoring quality of weld 106 being formed between first and second pieces (surfaces) 104a and 104b of a material 104. The method comprising the steps of heating the material 104 and the weld 106 with a heating source 102, collecting an infrared radiation (infrared wavelengths) passing through the material on the second surface (second piece) 104b, obtaining an image (plurality of images/ thermal data) by a camera 108, and analyzing the image by a computer 112. This would imply, that the camera captures the weld/ weld pool image in its entirely (thermal image/ temperature of each portion of the weld pool).

Chande et al. (U.S. 4817020) [hereinafter Chande] discloses in Fig. 3 a device/ method in the field of applicant's endeavor wherein a characteristic/ process parameter corresponding to a quality of the weld is a cooling rate (col. 1, lines 12-30). Chande teaches to obtain a real-time thermal image/ simultaneously with directing/ heating by a laser beam (col. 6, lines 45-68, col. 14, line 68), analyzing the image and providing a feedback to a weld controller, such that modifying a cooling rate (thus heating) in response to a feedback signal. This would imply that the thermal image (temperature) is being somehow compared with an image standard/ predetermined or desired image or threshold. Chande states that other thermal imagers can be used (col. 14, line 68, col. 15, lines 1-3).

Dostoomian discloses the device and method in the field of applicant's endeavor comprising welding together two materials in a localized spot by providing a heating

energy (by spot welders), and monitoring the spot (pool) for quality by obtaining an IR energy (thermal data) from the pool. This would imply that the device has a means for obtaining the thermal data. The device comprises a controller which adjusting the heating energy (magnitude of the weld current) by obtaining an IR energy/ temperature from the welding tips, while the IR energy provides a measure of the temperature (thermal data) of the weld (col. 3, lines 5-6). The controller has a differential circuit for generating an error signal and apply (feedback) it to the input of the spot welder (heater) throughout the course of the welding operation (heating) in response to the thermal data /temperature evaluation of the weld as compared to the standard thermal history stored in a memory and controlling (modifying) the welding current (heating) as required (in response to the feedback signal).

Any inquiry concerning this communication should be directed to the Examiner Verbitsky who can be reached at (571) 272-2253 Monday through Friday 8:00 to 4:00 ET.

GKV

Gail Verbitsky
Primary Patent Examiner, TC 2800

March 28, 2008

/Gail Verbitsky/
Primary Examiner, Art Unit 2855